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Selectivity in regeneration and reconnection of the oculomotor nerve in cichlid fishes.

Regeneration of the section oculomotor nerve has been found to yield various types of functional result in different vertebrate species, ranging from severe motor paralysis, mass contracture and squint, to complete recovery. Full restoration of normal eye movements was noted five years ago following some exploratory sections of oculomotor nerve in cichlid fish, Astronotus ocellatus. This result has been confirmed now in 16 additional cases and in four angel fish, Pterophyllum scalare. Further regeneration experiments were undertaken to find out whether selective re-innervation might be responsible or whether subsequent central readjustment in incidence of firing might be involved. Individual branches of the oculomotor nerve trunk were cut and mechanically reinserted into their own and into denervated foreign muscles within the oculomotor system in several combinations. The regenerating nerve branches established transmissive connections somewhat less effectively in foreign than in the original muscles, and the transposed nerves retained their original incidence of central discharge. The results suggest the presence of factors that selectively favor the original over foreign nerve fibers in reinnervation of these muscles.

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